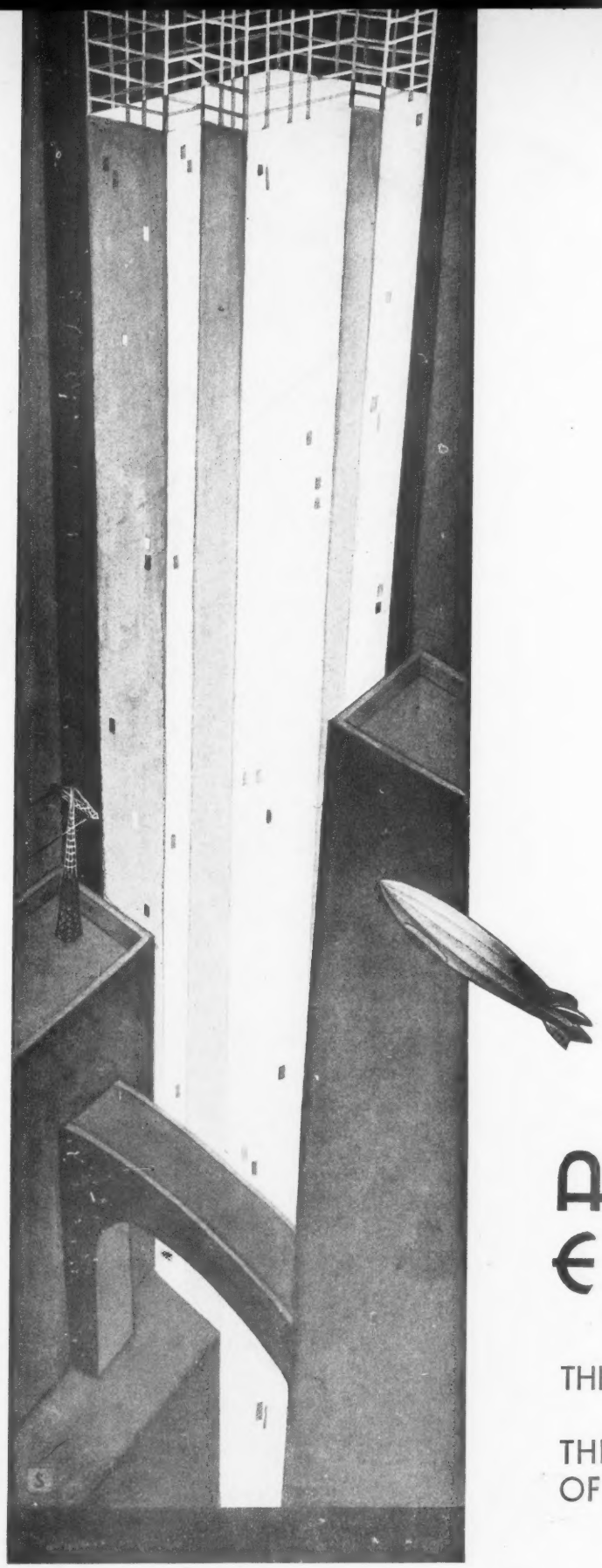

The AMERICAN ENGINEER

OFFICIAL PUBLICATION
THE NEW YORK STATE SOCIETY
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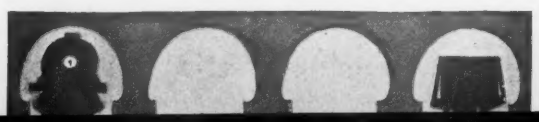

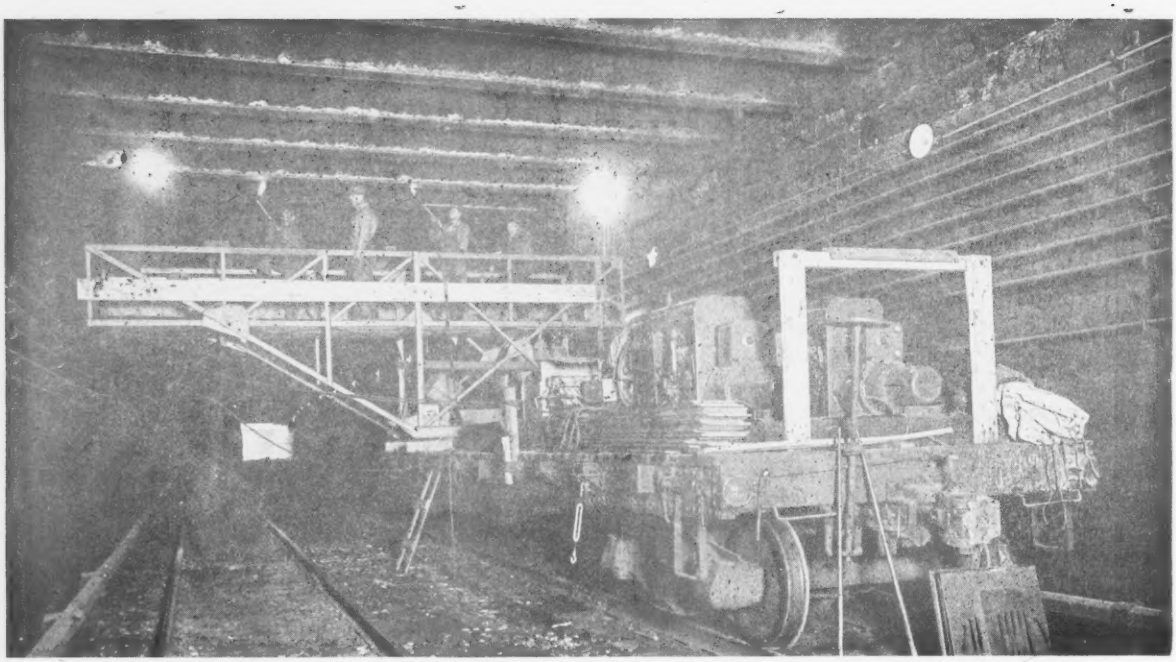

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and the Spirit of Christmas abide with you.

D. B. Steinman

THE AMERICAN ENGINEER

OFFICIAL PUBLICATION

OF

THE NEW YORK STATE SOCIETY AND THE NEW JERSEY ASSOCIATION OF PROFESSIONAL ENGINEERS

12 FIRST STREET, SAUGERTIES, N. Y.

and

POSTUM BUILDING, 250 PARK AVENUE, NEW YORK CITY

Editorial and Executive Offices, Postum Building, 250 Park Avenue, New York, N. Y.

TELEPHONE: PLaza 3-8031

J. C. VIEWEG, Publisher

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VOLUME 2 DECEMBER, 1932 NUMBER 12

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Arthur V. Sheridan, Editor

Yearly Subscription: United States, Insular Possessions, Cuba, Canada, Central America, South America, and Spain, $2.00; Foreign, $3.00; Single Copy, 20c.

Entered as second-class matter July 1, 1931, at the post office at Saugerties, New York, under the Act of March 3, 1879.

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THE AMERICAN ENGINEER

Published Monthly for
THE NEW YORK STATE SOCIETY AND THE NEW JERSEY ASSOCIATION OF PROFESSIONAL ENGINEERS

12 First Street, Saugerties, N. Y. and Postum Building, 250 Park Avenue, New York, N. Y.

NUMBER 12 DECEMBER, 1932

RELIEF FOR ENGINEERS

Unemployment Committee Issues Appeal

THE Professional Engineers' Committee on Unemployment has again appealed for funds to carry on the work of providing financial relief and emergency employment for the thousands of practitioners who are unfortunate victims of the present economic disorder.

The objective of the Committee's endeavor is to lessen, so far as is practicable, the distress that is at this moment so prevalent, especially amongst engineers. Last year this Committee functioned most effectively; probably more so than any other agency of a similar character. Many engineers were provided with work whilst others were enabled to negotiate loans intended to tide them over a period of acute pressure. That any human agency can, or ever will, be conducted without mistakes is expecting too much. It is by the results accomplished, rather than details incidental thereto, that the organization and the endeavor should be judged.

The New York State Society has a particular concern for the welfare of the engineer as a member of society and its support of this endeavor is pledged by virtue of its aims and hopes. The Metropolitan Area has been the scene of engineering's greatest accomplishments. It is today the scene of what may be termed the greatest distress that has come to the members of the profession in many generations. Public works have been curtailed to an absolute minimum; private projects are at a standstill, and thousands of capable, willing men, creditable members of the calling to which they have given the best part of their lives, are unable to secure even the most menial sort of manual labor that will afford an income.

The appeal of the Unemployment Committee, together with a form which engineers are requested to cut from the magazine, fill out and mail as directed, is printed on page XXIV of this issue. Its eloquence should prove sufficient to cause each of us to reflect and realize that fortune, and not merit, is responsible for the present position of every American citizen.

At the moment there are various organizations appealing for contributions to relieve the privations of the millions who are tramping the highways and byways in search of what is an almost forlorn hope—work. Such appeals are all worthy of your support. In many instances engineers are prominently identified with organizations such as the Gibson Committee and have pledged themselves and their associates for contributions to the same. There are community chest pledges and various other channels through which engineers are being canvassed. None, however, has so direct an appeal as has this one. Place yourself in the position of one of the many unemployed engineers. Where would you seek aid? Would you not appeal to the Engineers' Unemployment Relief Committee with more hope than to the other unemployment agencies, worthy as they may be?

A feature of the Committee's endeavors, especially deserving of comment, is the opportunity afforded engineers in need of funds. There are many who, though in straightened circumstances, are reluctant to forego the sense of pride which is part of a professional man's equipment. Through this agency it is possible, contingent upon reasonable investigation of circumstances, to negotiate a loan, that will enable a man to meet some pressing obligation upon which his all may depend. By so doing he is enabled to maintain his self respect and to at least indulge once more the hope that this plague will end ere long.

The following is a form of note which needs no explanation beyond the comment that the same bears no interest and makes the obligation of paying a moral one to be met when the borrower can do so:

"On demand, in consideration of the receipt from the United Engineering Trustees, Inc., (Professional Engineers' Committee on Unemployment) of .....Dollars, I promise to pay to the said United Engineering Trustees, Inc., (Professional Engineers' Committee on Unemployment) the sum of..... Dollars, without interest, at the office of its Treasurer, 29 West 39th Street, New York City."

Admiral Frederic R. Harris, a director of the New York State Society, is general chairman of the Committee which comprises many of the most prominent members of the profession in the Metropolitan Area. Lend your support to this appeal. Professionally, fraternally and humanly it merits a generous response from those engineers who are fortunate enough to be possessed of an income. Let it not be said that the profession that has done so much for others has proven unequal to the task of alleviating distress amongst its own.

USE OF THE TERM ENGINEER

Campaign Against Abuse Bears Fruit

THE New York State Society of Professional Engineers, under the vigorous leadership of President Steinman, has for some time been conducting a campaign against the indiscriminate use of the term "engineer." That its efforts are being rewarded may be gleaned from the comments of the press in various parts of the State and from the cooperation being given by the State Department of Education.

From the Long Island City Press of recent date comes the following:

"Engineer"

"A powerful weapon for battering down sales resistance will be out of use if the New York State Society of Professional Engineers successfully acts upon the recommendation of its Queens-Nassau branch that the title "engineer" be limited to genuine engineers.

"Making the suggestion to the State Society, Dr. D. B. Steinman, president of the Queens-Nassau unit, pointed out:

" 'The profession has suffered in prestige and public confidence from the multiplicity of cults, fads and quacks operating under the engineering title. Many adopt the designation "engineer" because the term has acquired the popular connotation of "expert," or "specialist." These offenders as a rule have no conception of what engineering really is.

" 'All members of the engineering profession are "engineers." They have studied "engineering." They are known to the public and to the profession as "engineers." This professional designation is their bond of solidarity. The word "engineer" unites all in a single profession. As the only designation that all members of the profession have in common it should be protected from misappropriation and abuse.'

"It is not too much the Long Island engineers are asking of the state in seeking protection for a single term that sets them apart from other professional men. Other professions enjoy a protection of the sort, why not engineers?

"But as we said, it has been an excellent means of lowering sales resistance. There is a potency in the word that immediately creates confidence in its hearer.

"Why not preserve that potency for the genuine engineer? Why have him, a qualified professional man, eventually afraid to admit he is an engineer as will probably be the situation if the term is allowed to be used by all manner of 'high pressure' workers?"

The Buffalo News of November 8th commented as follows:

What's An Engineer?

"Professional engineers rise to protest against the indiscriminate use of the designation 'engineer.' Through their New York State Society, including in its membership the most eminent men in the profession, they have opened a campaign to protect the title against abuse. They are employing moral suasion and legal reference to induce individuals, companies and corporations to discontinue use of the terms 'engineer' and 'engineering' where such designation is not legally authorized.

"In recent years the public has been introduced to 'plumbing engineers,' 'amusement engineers,' 'decorating engineers,' 'fumigating engineers' and a variety of others. The New York society complains also about the unauthorized use of the term 'engineer' by contractors and architects. It sets forth that the misappropriation of the designation tends to create confusion and derogatory misconception in the public mind as to the true nature and standing of the profession.

" 'No other learned profession,' says Dr. D. B. Steinman, president of the New York society, 'tolerates the unauthorized appropriation of its professional designations.'

"But one might suggest that the term 'doctor' is widely appropriated and applied. All physicians are doctors, but only a small percentage of those who use the title are members of the medical profession. Doctors are variously schoolmen, clergymen, lawyers, dentists, veterinarians, musicians and even dancing masters. But one must agree that men who have invested years in professional education and arduous training to qualify for a title should be protected in the possession of it. If a man is a professional engineer, his designation as such should not be debased through appropriation of the title by tinkers."

On Oct. 20th, last, the Brooklyn Daily Eagle, in reporting on a meeting of the Kings County Chapter, contained the following:

Engineers Plan Fight
On Name Use By Outsiders

A determined fight to prevent those outside the profession from advertising themselves as "engineers" will be waged by Kings County Chapter of the New York State Society of Professional Engineers, it was announced at a meeting of that organization last night, at the Brooklyn Engineers' Club, 117 Remsen Street.

A report from the Board of Education on a case investigated at the instigation of the Chapter, disclosed that a man representing himself as "Consulting Engineer" proved to be a glorified janitor whose duty it was to turn the light on and off, Roy C. Cram, Secretary of the organization, stated.

"Time to Get Protection"

"It is about time that steps were taken to see that our profession is properly protected in this regard," Cram stated. "A situation exists where plumbers, bug exterminators and janitors feel free to call themselves engineers."

(Continued on Page 13)

THE FORGOTTEN ENGINEER

Shall Society Continue To Ignore His Claims?

IN the New York Herald-Tribune of recent date there appeared the following news item:

"Frank C. Smythe, fifty-nine years old, of Aldan, Princeton graduate and civil engineer, a civil engineer who had been forced to accept work as a night watchman, was found dying in a tunnel beneath the new Pennsylvania Railroad Station at Thirtieth and Market Streets at 7 a. m. today. His pockets had been turned inside out and his watch and $20 which he was known to have had were gone. Four hours later, he died in the Presbyterian Hospital, without regaining consciousness. At the time of his death he was believed to have been the victim of an accident. Not until his wife, Mrs. Vera E. Smythe, looked over his effects and found that he had been robbed, was an investigation started.

"Smythe was graduated from Princeton in the class of '94. He was a son of the Rev. Henry Smythe. Until recently he had been a civil engineer for the Philadelphia Improvements Company, a subsidiary of the Pennsylvania Railroad. During the war he was a member of a group chosen among his profession by Brigadier General W. W. Atterbury to construct and operate a system of United States military railways in France. He served in France two years with the rank of captain. He had served the Pennsylvania Railroad for twenty years."

When the historian of tomorrow gazes back upon the civilization of today and summarizes what will his commentary be? Will he view the society of today as its leaders do? Will he speak only of the triumphs of machinery and the creation of wealth? Or will he point to the greatest regicide the world till now has witnessed, and to the countless thousands sacrificed upon the gory fields of Central Europe. Will he not be compelled to paint a picture of millions of human beings suffering the tortures of privation, misery and want? A land overflowing with the milk and honey required to alleviate their sufferings lies round about them, whilst they, like the untouchables of India, must keep their distance.

One is reminded of the famous poem by Thomas Hood—"The Song of Shirt." What bitter irony must have filled the heart of Frank C. Smythe? Day after day men continue to boast of human accomplishments whilst such incidents as the above rise up to plague society and to point out the shallowness of a civilization in which ingratitude, the cardinal sin of mankind, is so greatly in evidence. Of all classes of men none has been so completely forgotten in the conduct of existing society as has its principal cause, the engineer. Like the serf of a feudal age his services are claimed and capitalized by a master. Unlike the serf, however, he is unprotected in return for his allegiance and for the contributions he makes to his overlord.

Perhaps there are those who view the engineer's attempt to secure recognition as selfishness. Such people belong to the school of philosophy which contends that every motive is selfish. They are unmoved by the misfortunes of others and are stoics wherein the misery of mankind affects them not. They are those who sacrific their brothers upon the altars of war, of greed or of intolerance.

Throughout the ages man has been tyrannized over by one oligarchy or another. The masses are to all intents and purposes as enslaved today as during the centuries in which the human body was held in bondage. How puerile and unworthy of a true civilization are the contentions of those who expatiate upon human freedom whilst millions, begging leave to toil, are denied the very necessities of life because of a system which has become as tyrannical as ever usurped the stage of human existence.

It is folly upon the part of the government and so-called big business to close its eyes to the approaching inevitable change which can be accomplished with reason and moderation; but which will be accomplished with or without moderation.

Self preservation recognizes neither man made decrees nor vested rights and every social order that the world has experimented with came about as a result of human suffering and not reason. History contains convincing evidence of the fact that therapeutic treatment of existing social ills might have prevented surgical operations upon the body politic. The failure of government to assume the role of leadership is today responsible for the prolongation of a condition that is provocative of radical changes in a society that, in most cases, needs not change so much as regulation which will compel all to subscribe to the common good upon which the ultimate well being of the individual must depend.

A new economic order impends. For the preservation of fundamental principles it becomes the duty of government to regulate, not business, but finance and to give recognition to those who are engaged not in the speculation, but in the creation of wealth. The scientist and the engineer have made communal existence possible. Without them society cannot endure, and in the civilization of tomorrow they must be provided for, not as hewers and drawers of wood but as moulders of an era wherein the engineer will not, at the age of sixty, find himself at the mercy of a social system wherein a tyranny deprives him, not alone of the fruits of his labors, but even of his self-respect.

Perhaps mankind will never rise to the heights which the hope that springs eternal in the human breast inspires, but no civilization deserves the appellation of which it can be said that during a lifetime, Frank C. Smythe, scholar, engineer and soldier, served well his country and his fellow-men and in his age was rewarded with the neglect of an ungrateful society.

INGENIEUR.

THE ENGINEER MILITANT

By Erle K. Ramsey

THE Annual Address of the retiring president of the American Association of Engineers, delivered at its recent Convention in Washington, D. C., echoes pleas which have emanated from THE AMERICAN ENGINEER during the past two years. It is reproduced through the courtesy of the "Professional Engineer."

"In the days before the busses were threatening the very existence of the Iron Horse, stages transported passengers to points not served by rail. In those days 'stepping on the gas' was accomplished by swinging the lash and not a few of those stage drivers were quite adept in the use of the whip. One fine summer day one of the passengers was sitting alongside the driver, who was casually demonstrating his whip skill, a big horsefly was flicked into oblivion from the horse's rump. A mud-dauber, arching a graceful self on a fence post, suffered a like fate or rather didn't have time to suffer. A hornet's nest hanging on the bough of a tree was passed up. The passenger inquired, "How come you didn't pop that hornet's nest?" The driver spat a sunflower with accuracy and replied, "Son, a horse-fly is just a horse-fly, and one mud-dauber is just a mud-dauber, but a hornet's nest—well, that's an organization."

The engineer can hold his head high when he measures his accomplishments in things material. Civilization as we know it today is the work of the Engineer. Leave all other professions, such as Law and Medicine, at their present state of development, but eliminate the Engineer and Engineering in all its branches, and you will have turned the world back into the dark ages. Without hope of better, or adequate vision for the future, the human race would be crawling in ox-carts across uncharted frontiers, and only sailing vessels would be combating the contrary winds and unruly waves. Messages would still be carried horseback across the land to be read by the light of tallow dips and of whale oil lamps.

Today, the public takes for granted, and as a matter of course, the advantages our century bestows upon us, giving little credit to the engineer for the part he has played, and little realizing how intimately the work of the engineer touches him at every point and at all times. In most any large city should one particular work of the engineer fail to function for twenty-four hours, a scourge of death could be expected to sweep the city. That product of engineering brains, functioning under engineering supervision, is the city water purification plant, turning the befouled waters of our modern rivers into pure domestic water.

Why does the public so little credit the engineer for his accomplishment in its behalf? Why is the engineer the most poorly paid of all the professions of equal or similar mental attainment and specialized training? Why, in our industries, today, do they discharge without an hour's notice, engineers who have given years of faithful service and have saved and made for the company thousands upon thousands of dollars? Why does industry offer for the services of skilled engineers the wages of workmen in manual labor?

I'll tell you why. For seventy years we have been supine, we've been lying on our backs reading technical papers and we didn't do the things that Law and Medicine did to achieve the place they occupy in public esteem. And don't think for a moment that these two professions do not receive high recognition. If you think so, just compare the compensation received by a big corporation's chief counsel, with that paid the chief engineer. Think whether or not you, yourself do not place a high degree of confidence and respect in your physician or surgeon when you need his services. And you don't count the cost nor shop around for the cheapest nor call for proposals, or bids for services.

The prestige of the surgeon of today did not just happen. It is the accomplishment of a plan and an aim, an achievement of united effort and cooperation. The surgeon was once a barber, the journeyman barber, and the red and white barber pole of today is the surviving relic of the insignia of his calling, the bloody bandage on a stick. Among the leeches and herb doctors of his day he was of low estate. Contrast him now.

I have said that the engineer has not done what medicine did to merit public esteem. What did Medicine do? First she worked tirelessly to perfect Medicine as a science, she did constant and boundless research that acclaim might be merited. Aye, so did the Engineer and his accomplishments have been no less wonderful—many have been far more spectacular.

But, Medicine did something else; she joined all her practitioners into one all-inclusive organization —The American Medical Association, devoted primarily to the professional side, and to public relations. Then within this body, subservient thereto, were the societies for research and for recognition of professional accomplishment. Membership in the American Medical Association is as compulsory as state registration or licensing. With universal membership the Association molded legislation restricting practice—this to the protection of the profession and public alike.

While Medicine was carving out its niche, what was engineering doing? Just the opposite—instead of uniting into one powerful organization, it was diverging into an increasing number of separate, component parts, each with its own society—apart from, and not too friendly with the others, the civils, the mechanician, the electricals, the mining engineers, and so on.

Nor did they do any professional work, public relations, social and economic welfare. No indeed, it was all scientific and research. They did some

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SCIENTIST AND POET

Their Inspirations: Do They Parallel Or Converge?

By HARRY BELLER

DURING the nineteenth century, when Lord Kelvin declared that in order to prove a scientific truth one must produce a model, none ventured to confound a scientist with a poet. Scientists were considered crass materialists, and poets idealists. Scientists were riding high. Within four centuries, they had blasted many superstitions, disproved the geocentric idea and made the very thought of miracles questionable. Is there any wonder that the scientist was, in so many quarters, looked up to as the real agent of the Messiah? With many, God was dethroned and Man enthroned. The same enthusiasts in the intellectual world felt confident that the enigma of life, of death and of all other phenomena, even the creation and the very structure of the universe itself would be solved by the organum of science. Scientific thought, with its rod, clock and scale reigned supreme. Monastic cosmology was its dogma. The scientist eschewed the poetical approach, because poets were considered as mere meddlers with emotions, lacking in knowledge of that great key to power—logic. And so, poet and scientist were at opposite poles.

With the beginning of the twentieth century, however, scientists, themselves, exploded much of the materialistic dogmatism and man like Heisenberg questioned even the infallibility of determinism. Some vaguely, while others definitely, admitted that there is room for mysticism, but not in their realm. Upon those admissions, there shortly sprang up a host of rationalizers who declared very enthusiastically, that the great scientists are the real poets. For have not the scientists, an inkling of the very structure of the universe itself, and have not their minds an all embracing, unifying tendency? Hence, only the great scientists are the great poets. Is such actually so? In order to intelligently assent or dissent one must first examine the poet's and the scientist's approach, vision and understanding of the great panoramic enigma—the universe.

Upon careful scrutiny of the works of the great poets, starting with the Hebrew Prophets and thence to Homer, to Dante, to Shakespeare, Milton, Goethe and others down to the present age, we find that they view the universe through images. They see the whole universe as an infinitely huge, pulsating organism, in which the functioning of each individual part is influenced by the other parts. The individual parts may be simple or complex. Taken together, however, they make up the fathomless—UNIVERSE.

The poet, whose primary faculty is imagination, may be moved by a particular part of this great universe; as for example, the grandeur of a waterfall, or of gigantic mountains, or of the vastness and power of the ocean, or the tender beauty of the flower, the intricacies of human emotions, and so forth. His treatment of such phenomena, however, is subjective. His motive power is his intuition and his imagination, with the aid of his particular medium, such as words, tones or paint, portrays the images born of that intuition. These images become organisms throbbing with life. They are seen functioning as a whole as well as parts of the universe, but in every instance they are permeated by a vital spiritual force. During moments of inspiration, the poet feels as did Amiel when he wrote in his journal, "Great like the Universe, and calm like a God! From the celestial spheres down to the shell or moss, the whole of creation is submitted to our gaze, lives in our breasts, and accomplishes in us its eternal work with the regularity of destiny and the passionate ardor of love."

The poet does not see in the waterfall, in the woods, in the ocean or in the flower the perennial vibrations of electrons as does the physicist; or mere symbols and formulate as does the mathematician. A poet does not abstract, for to abstract as the scientist, or mathematician does, means to detach the metrical attributes of the whole, while the individual, familiar, vital image is snuffed out. A poet does not divide an organism into its spatial and time elements, or, as does Einstein, into space-time world lines which automatically devitalize and annihilate the intimate vision of the whole with its correlative influences. He sees synthetically with an intuitive grasp. His knowledge is implicit, immediate. A scientist, on the other hand, arrests the vital flow, analyses each element of the whole with the aid of his pointer readings, or symbols, as Eddington terms it, and then induces a synthesis. However, the pointer readings and formulae upon which his mind is concentrated absorb his attention to such an extent that when he completes the synthesis, it is more likely to be an ingenious mechanism or a mathematical conception than a vital organism as conceived by the poet. Eddington is keenly aware of it, and therefore he writes in his book, "The Nature of the Physical World," thus: "The scientific world is, as I have often repeated, a shadow-world, shadowing a world familiar to our consciousness. Just how much do we expect it to shadow? We do not expect it to shadow all that is in our mind, emotions, memory, etc. In the main, we expect it to shadow impressions which can be traced to external sense-organs."

One of the most apparently forceful, yet specious, arguments used by those who contend that scientists are poets is that when Einstein heard Yehuda Menuhin play he was so greatly moved that he exclaimed, "Listening to such playing one begins to believe that there is a Jehovah." Another argument is that Eddington, Jeans, and Sir Oliver Lodge show strong poetical tendencies in their writings. Such arguments do not prove that scientists are endowed with poetical inspiration nor that poets are gifted with the faculty of

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EXAMINATION QUESTIONS

For License as Professional Engineers

In answer to many requests concerning the knowledge required of candidates seeking to practice professional engineering in New York, the questions of the Examinations held in June, 1932, are printed herewith:

Part I
MATERIALS OF CONSTRUCTION

Tuesday, June 28, 1932—9:15 a. m. to 12:15 p. m., only

Answer any eight of the following questions. Slide rule and any reference books may be used. Return these questions with your answer paper.

1 Give the allowable acceptable working stresses for the following materials:

Structural steel (*a*) in tension, (*b*) in column compression, (*c*) in bending.

Reenforced Concrete (*a*) compression in bending, (*b*) in shear without web reenforcement, (*c*) bond stress between steel and concrete. [Mix 1:2:4]

Structural timber (*a*) in flexure, (*b*) in bearing, both perpendicular and parallel to grain, (*c*) in shear. [Yellow pine or Douglas fir]

2 Explain briefly the water-cement ratio theory of proportioning concrete for strength.

3 A reenforced concrete slab is 48 inches wide, 5 inches deep to the center of gravity of the steel reenforcement, 6 foot span and has a total of 2 square inches of steel rods reenforcement. If the outermost fibre of the concrete in this beam is stressed to 650 pounds per square inch, what will be the stress intensity in the steel reenforcement?

4 Compare the strength of a wood beam with that of a steel beam of equal weight.

5 *a* Compare briefly the qualities of the following stones as aggregate, giving reasons: fine marble, trap, granite (coarse), sandstone.

b Just what has happened, chemically and physically, when mortar fails after a few months in a structure?

6 Compare the strength of a column 10 feet in length having an 8″ x 8″ cross section with that of a hollow square column of the same area having inside dimensions 8″ x 8″. Use the following column formula:

$$\frac{P}{A} = 16{,}000 - 70\,\frac{1}{r}$$

7 Calculate the increase in length of a 100-foot steel tape ½″ x $\frac{1}{16}$″ in cross section, if a pull of 16 pounds is applied when the tape has been standardized at 12 pounds pull. Modulus of elasticity is 30,000,000 pounds per square inch.

8 What should be the thickness of a 12-inch wrought-iron pipe carrying water under a head of 300 feet with a factor of safety of 15? Compute the weight of the pipe per linear foot.

9 The pressure in the cast-iron cylinder of a steam engine is 120 pounds per square inch and its internal diameter is 10 inches. What should be the thickness of the cylinder walls to satisfy adequate strength requirements?

10 What should be the spacing of 4″ x 4″ timber posts 6 feet long, supporting a horizontal platform which is loaded with a uniform load of 200 pounds per square foot? Allowable stresses should conform to New York City Building Code requirements.

11 A timber beam is 3 inches wide by 8 inches deep. It spans a 12-foot opening and carries, in addition to its own weight and a uniformly distributed load of 50 pounds per linear foot, a concentrated load *P* at the quarter point of the span. Calculate the safe value of *P*. The beam is of good quality, long-leaf yellow pine.

12 Determine the diameter of a solid circular steel shaft capable of transmitting 200 horse power at 1100 r. p. m. Assume that under certain conditions the maximum instantaneous torque is twice the average. The maximum shear stress intensity is limited to 6000 pounds per square inch.

Part I
STRUCTURAL DESIGN AND GRAPHICS

Tuesday, June 28, 1932—1:15 to 4:15 p. m., only

Answer any eight of the following questions. Slide rule and any reference books may be used. Return these questions with your answer paper.

1 Two wheels spaced 6′-3″ apart, each carrying 7600 pounds, roll across a simple beam having a span of 19′-6″. compute

a The maximum live shear.

b The maximum live moment.

2 Make a sketch of a strut consisting of 2 angles 4″ x 4″ x ⅜″, latticed and battened. The angles are to be 6′-0″ long and spaced 1′-6″ apart. Using appropriate unit stress, determine what amount of compression the strut could withstand.

3 A plate girder, span 40′-0″ center to center of end supports, carries a uniformly distributed load of 4000 pounds per foot of length. The girder is 42½ inches back to back of flange angles. It connects at each end to the flange of a 14-inch H column. Make up a section of this girder. Make a sketch to scale, showing detail at end connection to column, also rivet pitch in flange angles at end of girder.

4 Roof trusses with span 60′-0″ and a rise of 10′-0″ are spaced 16′-0″ apart (between trusses). They support the roof of a mill building and are supported by H columns at each end. The truss is divided into 6 panels by vertical web members. Diagonal web members slope toward the ends of the truss. Roofing consists of slate shingles supported on 1¼-inch timber sheathing. This is supported by purlins running between trusses at panel points. The live load may be taken at 30 pounds per square foot of horizontal projection of roof. Estimate the panel loads on truss and compute stresses in members. Design *one* tension and *one* compression member. Make a sketch showing detail of joint at end.

5 Answer the following questions briefly but clearly:

a What is the purpose of using intermediate stiffeners on plate girders?

b What is the function of batten plates and lacing on the open sides of compression members?

c In designing structures to carry moving loads, why are allowances made for impact stresses?

d Why do specifications require that the number of rivets carrying calculated stresses be increased in the case of long rivets?

6 Make a complete design of a timber platform (material, yellow pine' 12′-0″ wide and 15′-0″ long. The platform is supported by 4 timber posts 8′-0″ high, one at each corner. It is to be designed to carry a total load of 270 pounds per square foot over the entire area. Make sketches illustrating the design.

7 Compute the maximum and minimum stresses in the members in and adjacent to the second panel of a through Pratt truss having six panels 24′-0″ long (span = 144′-0″) and a rise of 28′-0″; the loading is as follows:

Dead load on upper chord 300 pounds per foot.

Dead load on lower chord 1200 pounds per foot.

Live load on lower chord 4000 pounds per foot.

8 An interior bay, in a reenforced concrete building of the beam-and-girder type of construction, has columns spaced 18′-0″ by 21′-0″. Floor beams are 18′-0″ long and divided the 21′-0″ span of the girders into three equal spans of floor slab. The floor finish consists of 1″ granolithic. Live load on the floor is to be 160 pounds per square foot. Design floor slab and floor beams. Show sketches giving size and spacing of reenforcement.

9 *a* Design a reenforced concrete column to carry a load of 360,000 pounds. [Height of column = 11′-0″; assume 2000 pound concrete and $n = 15$]

b Design square footing for above column, bearing on soil equal to 6000 pounds per square foot.

10 *a* What is a fillet weld? Give an example, showing how the strength of such a weld is calculated.

b Explain and illustrate how a splice in a plate girder web plate is designed.

c Explain how you would determine the number of timber piles required to carry a foundation load.

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WHAT IS TECHNOCRACY?

By Wayne W. Parrish

(Printed with Permission of the Outlook)

(Concluded from Previous Issue)

The research is known as "The Energy Survey of North America," which Scott began ten years ago. Its nature and scope is purely a technological analysis of the forces which condition our social structure. It has never been concerned with profits or wages or prices, or any corporate disbursements whatever. It has concerned itself simply with a quantitative determination of the physical production of this continent and of the energy consumption involved in that physical production—in short, the behavior of our social and industrial mechanism. The facts have been uncovered from the records of industrial establishments, corporate reports, trade associations, and state and Federal sources. Specifically, the plan has been to plot on charts the industrial and agricultural development of the United States during the last 100 years in terms of employment, production and energy expended. It was to picture our civilization in the only accurate terms in which it can be depicted and on the only basis which permits quantitative analysis of the picture. Three thousand leading commodities were selected for the study, ranging from wheat and cotton to steel and power. At the present time, several hundred of these charts have been completed and are being kept up to date, week by week.

The damaging evidence revealed with indisputable clarity by the completed charts points only too certainly to the end of an unhampered era of expansion. Through industry after industry the evidence discloses a change from increase production to a business of replacements. The basic facts disclosed by the charts for each of the 3,000 commodities is the amount of energy expended annually in production, the number of men employed and their working hours, and the volume produced each year; also, the rate of growth of production, the decline in the amount of man power needed to produce a unit of each commodity from year to year, the total installed horsepower for each unit produced of each commodity each year, and the total installed horsepower of the industry. The highs and lows of inflations and depressions, translated into production, energy and employment, stand out in oscillating curves on each chart. The picture is so complete in this way that when the research was taking form in 1920, our present depression was clearly discernable, except that Technocracy had the crash occuring in 1930 instead of 1929—an error of about six months.

A decade ago it was heresy to criticize adversely the industrial outlook for America. Only Bolsheviks and Reds of the lowest order would think of throwing cold water on our plans for unlimited expansion. Criticism, no matter how scientific, was traitorous. In such an atmosphere Technocracy's views were greeted with apathy when it attempted to inject a sane voice into public discussion. After much discouragement it finally burrowed itself under cover, kept quiet, and continued to develop its far-reaching research. Now, in the midst of a steady decline on every hand, the demand for its data has become immense.

The increase in power has been so tremendous within the past twenty-five years that it is difficult to grasp its full significance as applied to the social structure. For 7,000 years of social history there was no change in the rate of doing work. The human being was the best engine society had. Prior to the first quarter of the nineteenth century—just a little over a century ago—our engines of conversion, which were human beings, were the same as those of the Pharaohs. The human machine averaged under 200 pounds in weight and was capable of an output of one-tenth horsepower unit per eight-hour day. Now look what happened. The steam engine was introduced, electric power came into being, and within one hundred years we have multiplied the original output rate of the first, or human, engine by 9,000,000 as expressed in a modern transversion unit! But most significant of all is the astounding fact that most of this advance, or 8,766,000 of the 9,000,000 increase, has come within the last thirty years. Is it any wonder that our ancient political system is hopelessly incompetent to furnish the rigorous and exacting technical control necessary to save our highly powered industrial system from collapse?

Another important feature of the static society that existed up until a century ago was that the energy consumption per capita per day never went above 2,000 K. G. calories, even in the highly socialized orders of Egype, Greece or Rome. Today, in North America, we have reached an energy consumption of 154,000 K. G. calories per capita per day, and again, much of this increase has come since the turn of the century.

The peak of employment in industrial production in the United States was reached in 1918, but it was not until 1929 that our maximum of production was achieved. An important factor is that the number of man hours of human effort required per unit of output was greatest 100 years ago and has steadily declined ever since until in our best practices the man hours per unit of product approaches the zero point. The rate of replacement of men by machines exceeded the rate of expansion of the industry.

We hear a great many plans these days for bringing about industrial recovery. Some of our so-called leaders are talking about developing "new industries" that will absorb the unemployed, without realizing that technocracy prevents any material absorption in that line no matter how many new industries are created. Some are still speaking glibly about developing our foreign markets" without knowing what they're talking about. To those who are presenting these plans, Technocracy poses a few fundamental questions. Can we re-employ ever again under a price system all those of employable age at a wage standard which will provide sufficient buying power to meet the requirements of our productive capacity? Is recovery just around the corner with from one to two years supply of wheat, corn, cotton, copper, rubber, iron ore and other commodities in our warehouses?

Technology's best argument against the claim advanced for "new industries" is the example of the proposed factory-fabricated housing project which has been reported about the nation. By means of factory-made houses, apartment buildings and office buildings, it was planned to revive an old industry by opening up a new market through the elimination of slums and modernization of rural houses. The American Rolling Mills, the A. O. Smith Corporation and General Houses, Inc., have been experimenting with this plan and have erected completely furnished units in several large cities. The general argument is that by selling these houses on the instalment plan, a huge market would be created that would push the nation out of depression into prosperity.

Unfortunately, the idealists back of this proposal did not take into account the technological aspect, for these factory-made houses, completely equipped with every modern convenience, can be produced on a continuous straight line process, with an output of from thirty to fifty miles of eight by twelve-foot sections a day with less than 200 operators to the plant. This would fail not only to absorb the unemployed, but it would tend toward the total elimination of masons, bricklayers, painters, plumbers, electricians and the like, and further disrupt the entire building trade! The reader's first reaction is undoubtedly that such standardized housing would never be acceptable in America. He should remember that he has accepted standardization in other lines without a whimper and the modernity of factory-fabricated houses would in a large measure appease any such objections,

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NEW YORK NEWS

SENATOR DESMOND RE-ELECTED

As prophesied some time back in the American Engineer Thos. C. Desmond is a representative of the engineering profession who appears headed for high public recognition.

Despite the recent democratic landslide Senator Desmond was overwhelmingly re-elected by an increased plurality to represent the 27th Senatorial District of this State.

The following comment from the Newburgh News of November 11th is significant:

WHAT DESMOND IS THOUGHT OF

"The magnificent vote received by Senator Thomas C. Desmond attests the people's confidence in him and their appreciation of his services to his district and the State. Completing his first term in the upper house of the Legislature, Senator Desmond went before the people of Orange and Sullivan Counties last Tuesday for endorsement of his work and for a commission further to serve them, and they responded with a flood of ballots as eloquent as they were significant."

Senator Desmond, who is a director of the New York State Society, sponsored all of the recent legislature affecting the engineering profession in this State. Congratulations and best wishes to you, Senator, from the Society and from the American Engineer.

* * *

Chapter Activities

QUEENS COUNTY

Upwards of one hundred Engineers with their wives and sweethearts gathered at a testimonial card party and dance at the Queens Medical Centre, at Forest Hills on November 22nd, to pay honor to Edgar A. McKenna, the first President of the Queens County Chapter.

Mr. McKenna has a record of distinguished service to his Chapter and to the State Society. He was elected to the Presidency of the Chapter in the early part of 1929 by twenty Engineers whose belief in the high purposes of the Society was perhaps greater than their hope in the achievement of them. He enthusiastically addressed himself to the recruitment of his organization under discouraging circumstances. He made his effort in a borough of a great city which, in the opinion of many engineers, was already filled to overflowing with Engineering organizations — Borough, Municipal and National organizations. The new Society was regarded by many as "just another Society"—superfluous, unnecessary — whose inauguration would but add to confusion of purpose and conflict of effort. But patiently and persistently stating the aims of the Society and explaining wherein they differed from, and supplemented, those of existing societies he excited interest and enlisted new support. Under his leadership the Chapter cultivated the friendship of civic and professional organizations in his County by cooperating in public endeavors comprehending work of an engineering nature. Services were rendered to the community which were commended by the public press and praised by public authorities and civic leaders. His Chapter attracted to itself the most outstanding members of the profession in the County and during the three (3) years of his presidency increased six-fold in membership. And at the end of his long term of office when he had the satisfaction of realizing that his Chapter had grown to be rightfully regarded as one of the most progressive in the State he passed on the torch of leadership to J. Franklin Perrine who, as the Chapter's present guiding genius, is so ably preserving and promoting its splendid traditions of progress and service. Recognition of Mr. McKenna's record and capacity for service has spread beyond the confines of his County and he now has the honor of serving the State Society as one of its Directors selected for the responsible post of Chairmanship of the State Constitution Revision Committee.

Mr. Perrine, as spokesman of the assembled guests, presenting Mr. McKenna with an electric clock and bridge lamp as a memento of the occasion, conveyed the felicitations of those in attendance and of a legion of well-wishers in the County.

Among those present were Andrew K. Johnson, Chief Engineer of Highways, and William Bishop, Engineer of Maintenance, both of the Borough of Queens and George Bruns and George Winn, Consulting Engineers.

The success of the endeavor was due in large measure to the admirable preparations of the Committe of Arrangements which was composed of William H. Bertram, Edward J. Flanagan, Martin Nelson and Ignatius Conway.

* * *

DUTCHESS COUNTY

Mr. G. H. Underhill, of Poughkeepsie, Chairman of the Publicity Committee of the Dutchess County Chapter has written to Mr. W. A. Stubbs, Acting Executive Secretary of the State Society, requesting information regarding publicity methods of the State Society and Chapters which have been found by experience to be unusually successful. It is hoped that the information he has received will prove of value and that the activities of the committee in the interest of this new and promising Chapter will be notably effective.

* * *

RICHMOND COUNTY

The Richmond County Chapter held a meeting on November 10th in the building of the Staten Island Institute of Arts and Sciences.

The Chapter took another forward step in adopting a Schedule of Fees for Engineering Services supplementing the Schedule of Fees for Surveying Services which had previously been adopted.

The Chapter authorized its Committee on Laws and Grievances, under the chairmanship of Walter E. Pettigrew, to cooperate with the Grievance Committee of the Staten Island Society of Architects to adopt means to secure observance of the Architects and Engineers License Laws of the State. This joint committee will not only accomplish much through coordination of effort but will also form a nexus between the complementary professions of Engineering and Architecture which will tend to promote a fuller realization of the many interests they have in common and increase that mutually friendly regard which is so desirable between such closely allied groups.

A special committee was appointed under the chairmanship of James Tietsch to consider the desirability of the creation of a committee to study and advocate Zoning modifications for the island.

Richmond County Chapter under the skillful guidance of its President, Fred H. Zurmuhlen, Jr., has developed a civic and professional consciousness which has been productive of a long and enviable record of accomplishment.

* * *

BRONX COUNTY

The regular monthly meeting of the Bronx County Chapter was held at the Concourse Plaza Hotel on November 10th. The guest speakers of the evening were Mr. Joseph C. Evans, Terminal Engineer, and Colonel P. L. Gerhardt, Industrial Consultant, both of the New York Port Authority. The subject of their joint discussion was the Inland Terminal No. 1, a central facility, for the use of Railroads serving New York City, where incoming and outgoing freight is collected or distributed for transportation or delivery. The subject of the location, layout (which allocated part of the building to light manufacturing and offices used for economic reasons) and construction of the Terminal was presented by Mr. Evans who assisted his auditors in their visualizing efforts by means of stereopticon slides. Colonel Gerhardt discussed the adaptation of the plan to the uses for which it was intended, together with the methods of its operation, and illustrated his discussion with motion pictures. The attendance was large and notably keen interest was manifested.

The Building Code Committee—composed of Abraham Slavin, Engineer and Architect, Edmund Brittan, Engineer and Surveyor, (both in private practice) and Edward Crinnion, an Engineer employed in the Bureau of Buildings in the Borough of The Bronx—made a tentative report on its studies of the proposed Building Code of the City of New York.

The proposed Code is the result of nearly four (4) years of study by hundreds of experts in the fields of building construction and the manufacture of materials of construction. It was prepared, with the approval of

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NEW JERSEY NEWS

ASSOCIATION PROGRAM OUTLINED

A meeting of Trustees, Officers and Chapter Secretaries was held at the Elks Club in Newark, on November 30th.

On October 18th the following correspondence was forwarded to all Chapter Presidents, Secretaries and to members of the Committee on Legislation:

Oct. 18th, 1932

To All Presidents and Secretaries of Chapters and Members of the Committee on Legislation.

Dear Sir:-

Within a short time a call for a fall meeting of the State Association will be sent out. The purpose of the meeting is a discussion of proposed activities of the Association during the next legislative session.

I have compiled and attach hereto a list of items that I have discussed with members of the Association some of which have been proposed by others, all of which to my mind, deserve consideration.

Realizing that it will be impossible to discuss all these points in one meeting and come to a definite conclusion on all of them unless there is an advance discussion among the chapter members, I respectfully request that you kindly submit these points to your chapter for an early discussion.

Secretaries please will forward the extra copies to the members of the legislative committee of their chapter.

Enclosed is a copy of a letter which I have received from Mr. Crandall, Secretary of the New Jersey State League of Municipalities.

I fully realize that it is impossible for us to do all the things outlined in the program submitted and it probably would be best if for this year's legislation we concentrate on one or two things and defer action on others. The membership should decide exactly what it wants and then have the Legislative Committee take care of further action.

Very truly yours,
ARTHUR NOACK, President.

* * *

NEW JERSEY STATE LEAGUE OF MUNICIPALITIES
BUREAU OF MUNICIPAL INFORMATION
502 Trenton Trust Building,
Trenton, N. J.

October 12, 1932.

Mr. Arthur Noack,
51 Court Street,
Hackensack, N. J.

My dear Mr. Noack:-

Word has come to me that the Engineers Association of which you are the President, is already taking steps to be very active at the next session of the Legislature and undoubtedly will be sponsoring measures which will be regarded favorably by the League of Municipalities. It seems to me that there is a good opportunity for your organization and ours to join hands where common interests are involved, and I would appreciate it if you let me know the personnel of your Legislative Committee.

Our Legislative and Engineering Advisory Committees have not yet been named and will not be named until our first Executive Board meeting following the convention. If you could let me know who will be on your Legislative Committee, it is entirely possible that we could place many if not all of your men on our committee also, and not only save a duplication of efforts but bring about a co-operation which would be helpful to all concerned.

May I hear from you?

Sincerely yours,
(Signed) B. L. CRANDALL,
Executive Secretary.

* * *

Proposals offered for discussion to the members of the New Jersey Association of Professional Engineers & Land Surveyors.

I. *Promoting Legislation Favorable to the Profession.*

1. Creation of the office of "County Surveyor" in metropolitan counties.
2. Creation of Municipal Engineering Districts with subsequent tenure of office.
3. Tenure of office for municipal engineers not protected by Civil Service.
4. A clarification of the position of the engineer when employed in building construction work.
5. Legislation to permit municipalities to operate sewer systems as self-liquidating utilities.

II. *Protest Against Possible Legislation Detrimental to the Profession.*

1. Gasoline tax diversion.

III. *Requests to be Submitted to the State Board of Professional Engineers.*

1. Raising of educational standards and extension of requirements of practical experience before granting a license.
2. The assurance that the State Board will enforce the Code of Ethics.
3. An omission of the distinction between different branches of engineering in the license certificates.
4. The assurance that no new license will be granted by the Board without submitting applicant to a written examination covering general engineering principles and sundry subjects in one of the four major branches i. e. civil, electrical, mechanical and chemical engineering. Except only those who have been registered by the National Council of State Boards.
5. Requesting the State Board to urge governing bodies to forbid men employed on a salary basis for full time work to do private work in competition with private practitioners.

IV. *Amendments to Constitution and By-Laws of Association.*

1. Regulation of dues and their collection.
2. Fixing the term of the Legislative Committee appointed by one President for one year beginning July 1st.
3. Establishing of permanent headquarters during legislative sessions in Trenton and providing for expenditures by higher dues.

V. *Co-operation, and if Possible, Amalgamation with Other Engineering Societies in the State.*

VI. *More Members.*

This enabled those present to come prepared to pass judgment formed after due deliberation with the result that practically every item was disposed of.

The appended brief transcript of the moments of the meeting should be read carefully by the membership at large.

Meeting of Trustees and Chapter Secretaries at the Newark Elks Club, November 30, 1932

President Noack called the meeting to order and stated that the purpose of the same was to have Chapter representatives and Trustees of the Association express their views relevant to legislation and other matters of interest to the Association.

At the request of President Noack, Mr. Kelly read the letter sent by the President to all Presidents and Scretaries of County Chapters and members of the Committee on Legislation.

Reports on the legislative matters contained in the letter were received from West Jersey, Bergen and Union County Chapters, the same were read by the Secretary.

Discussion followed, talks being delivered by Mr. Breitzke of Morris County, Mr. Schmucker for South Jersey, Mr. Sherrerd for Essex County and Mr. Ackerman for Bergen County.

Acting upon a suggestion, the proposed legislative measures were taken up singly and disposed of as follows:

I. *Promoting Legislation Favorable to the Profession.*

1. Creation of the office of County Surveyor in metropolitan counties.
2. Creation of Municipal Engineering Districts with subsequent tenure of office.

These two proposals were referred to a special committee for study and report next year.

3. Tenure of Office for municipal engineers not protected by Civil Service.

This matter was referred to the Legislative Committee for a report on the feasibility of introduction to the legislature.

4. A clarification of the position of the engineer when employed in building construction work.

Referred to the Secretary of the State Board for notification of Building Inspectors in various communities of the provisions of engineering act.

5. Legislation to permit municipalities to operate sewer systems as self liquidating utilities.

Referred to Legislative Committee for further study and report.

II. *Protesting Against Possible Legislation Detrimental to the Profession.*

1. Gasoline Tax Diversion.

It was voted that the Association go on record in favor of a toll charge on the new High Leval Viaduct.

III. *Requests to be Submitted to the State Road of Professional Engineers.*

1. Raising the educational standards and extension of requirements of practical experience before granting of a license.

Laid over until complete report from National Engineering Council is received.

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GENERAL NEWS

AESTHETIC ENGINEERING

Beauty As Well As Utility Desirable

The New York Times of Nov. 28th editorially discusses the subject of engineering artistry under the caption of:

Art in Bridge-Building

The selection of the Bayonne-Staten Island bridge by a jury of the American Institute of Steel Construction as the most beautiful long-span structure of the kind built during the last year is an honor that must gratify the Port of New York Authority. That body feels responsibility to produce not only bridges indispensable to transportation but bridges attractive in design. Long as the span is over the Kill van Kull, there is a symmetry and fineness of detail about the Bayonne bridge that is impressive and haunting. The jury was of high class, consisting of Professor Dillenback of the School of Architecture, Columbia University; Professor Bishop of the Sheffield Scientific School; F. O. Dufour, consulting engineer of Philadelphia; Raymond M. Hood, architect, of New York, and A. L. Kocher, editor of the Architectural Record.

Fifty years ago it was the judgment of a German commissioner, who had been sent to the United States to report on our railway system, that "in America public works are executed without reference to art." Particularly was that true, in his opinion, of bridges. But it is true no longer of any form of construction, although it will have to be admitted that the temptation to disregard art for economical reasons is not always resisted. Henry Van Brunt, a famous American architect, found "the arched bridge of stone, the catenary curves of the high modern suspension bridges, with their high towers, and some forms of bridges constructed with bow string girders" artistically attractive, in contrast with "the straight bridge truss spanning from pier to pier, the cantilever overhanging the perilous abyss and the pivoted draw-span, all constructed with cold geological precision."

Every country has its share of ugly bridges. Even when a bridge is not picturesque for artistic reasons, not to speak of historic and legendary values, there are critics who find no beauty in it. The Tower Bridge of London is one of these. Modern engineers no longer regard the bridge as a "tool of transportation," and they welcome the cooperation of architects. Perhaps few of them would, however, accept Michelangelo's conclusion: "A bridge ought to be built as though it were intended to be a cathedral, with the same care and the same materials." More and more fine bridges are going up in the United States. Each year the American Institute of Steel Construction makes awards that tell the story of art coming into its own. The merits of medium-sized and small bridges, as well as those of stupendous spans, are recognized. For instance, the Stewartstown arch bridge over the Connecticut in New Hampshire is one of the selections of this year. Of the Bayonne-Staten Island bridge it is said that it "represents the highest type of bridge esthetics."

Comment: It is encouraging to note that the public is gradually awakening to the potentialities as well as the accomplishments of engineers.

* * *

HEINZERLING MANUAL

Reviewed by New York Times

Considerable recognition has been accorded volume one of the Man-Hour Electrical Estimate Manual recently released by the Rurick Press, and prepared by Theodore Heinzerling, one of the Society's most ardent well wishers.

The New York Times of November 24th contains the following account of the publication:

ELECTRICIANS HAIL MAN-HOUR MANUAL

Experience on 15,000 Buildings Said to Make Estimating an Exact Science

"A man-hour electrical estimate manual, the first of its kind, which, experts say, makes electrical estimating an exact science, enabling contractors, builders, engineers, architects and others to tell from the beginning just how many man-hours each given job will take, has been published this week by the Rurick Press, Inc., of 303 West Forty-Second Street.

The manual was compiled by Theodore Heinzerling, New York consulting electrical engineer, who has been a recognized expert of electrical estimating for many years. The work is based on the actual figures obtained in the study of electrical installation in 15,000 buildings in many parts of the United States. It took eleven years of preparation.

The manual measures 8 to 11 inches and opens the long way. It has 384 pages of figures, showing the man-hours required to install various quantities of "every kind of electrical equipment in every kind of building construction."

The book is divided into three parts: Introduction, Man-Hour Charts and Convenience Wiring Charts. The introduction gives detailed directions for preparing an electrical estimate, as well as directions in the use of the data in the book.

The man-hour charts consist of a comprehensive collection of labor time data taken from the cost records of the 15,000 buildings, which give the man-hours required for the installation of seventy-one different types of electrical equipment, in every type of residential, commercial and industrial building.

Three complete sets of man-hour figures are presented: "competitive," "compensative" and "conservative." Competitive figures represent the man-hours required to install electrical equipment under the most favorable conditions; conservative, under the least favorable conditions, and compensative, under average conditions.

Man-hour figures are given for various quantities of each kind of electrical equipment. For example, man-hours for installing conduit in any number of feet, from 1 foot to 10,000,000 feet, of any size, from one-half to 6 inches, may be taken directly from the charts. This, it was pointed out, "saves a great amount of time in estimating and reduces the chance of mathematical error to a minimum."

There are six wiring charts containing the following engineering data: wire carrying capacity of mild steel conduit; size of wire, conduit, starting switch, and fuses for all sizes of motors; tables for figuring the proper sizes and combinations of pulleys and gears for various speeds and loads; data for installing all sizes of lighting panel boards, and carrying capacity of various sizes of conduit for lead-covered cable. Illustrations are given on how to use these charts.

The manual is being hailed by many well-known electrical engineers as a valuable contribution to the electrical industry. Among its users are electrical contractors, builders, general contractors, achitects, engineers, light and power companies, telephone companies, railroad and industrial plants, city and State architects and engineering departments, banking and bonding houses, financing construction projects and electrical wholesalers and manufacturers."

The Society congratulates Mr. Heinzerling and acknowledges his magnanimous proposal to further its aims by making it a beneficiary of the royalties accruing from the sale of this most comprehensive manual. Volumes two and three of the work, the result of so many years of effort, are scheduled to appear shortly. The publication is a real contribution, the most complete of its kind, to the reference library of engineers, architects, contractors, manufacturers, power companies, railroads and various others and the American Engineer recommends it for the attention of practitioners generally.

* * *

AN INOVATION IN BRIDGE BUILDING

Commentary by Dr. J. A. L. Waddell

A most interesting and instructive dissertation upon the use and practicability of open steel floors of light weight has recently been received from one of the world's authorities on bridges,—Dr. J. A. L. Waddell.

The article discusses the use of a patented steel floor grating, which is the design of Walter E. Irving, President of the Irving Iron Works of Long Island City, New York. The paper of Dr. Waddell is on file at the office of the New York State Society and copies may be had upon request.

The Engineer Militant

(Continued from Page 6)

wonderful work in perfecting engineering as a science, but nothing to further public recognition as Law and Medicine were doing. And what an opportunity they missed those years when material accomplishments were so spectacular, and when engineering was a profession that then had more intimate contact with many individual clients, and was less a salaried profession than it is now.

Today, half a century later, we have the American Association of Engineers as the only society of National Scope where the members of all branches of the great but imperfectly appreciated profession of engineering join in cooperative effort to bring nearer the day when the Engineer assumes his rightful place in public esteem, and when his social and economic status if second to none among the professions.

A. A. E. has pioneered every forward step toward that goal, and has accomplished much to make engineering a better profession, for your son and mine, than we found it—but much remains to be done. Though the accomplishments of the past have been eminently worthwhile, we haven't carried all objectives, nor functioned without error—but we have tried to do things—we have been militant.

Being militant, we are not content to see the profession unlicensed and unregistered, so that any charlatan may call himself an engineer, endangering public life and property and bringing the profession into disrepute. Our efforts have placed registration on the statute books of a goodly number of states, and we are still carrying on.

We were not content to see fake correspondence schools, mulch the uninformed youth through false and glowing allurements, and, after taking his savings send him forth deluded into thinking himself an engineer to attempt to compete with our younger engineers—lowering standard of salaries and retrograding the profession. Our vigorous campaign has caused the dissolution of a number of so-called schools of this ilk."

* * *

Use Of The Term Engineer

(Continued from Page 4)

A member of the organization will serve as a representative on the Council of the Citizens Budget Committee, it was announced. Engineers come in close contact with civic and municipal problems and it was felt necessary to be represented on the Committee, members declared.

Recently the appended statement was released:

How the State Education Department is Cooperating

"The New York State Department of Education, charged with the administration of the professional practice acts, has repeatedly requested that all cases of violation of the Engineers Licensing Law be reported to the Department (at Albany) for investigation and action. Upon receipt of complaints investigators are assigned to the cases, and the staff of the Attorney General is made available to prosecute such cases in the courts. One significant conviction under the Engineers Licensing Law has already been secured.

"The cooperation of the State Education Department in the program of law enforcement, with particular reference to the protection of the title 'Engineer,' is exemplified in the following letter recently recieved from the Department by a land surveyor who assumed the designation 'Civil Engineer';

"Dear Sir:

"Enclosed is a copy of Article 55 of the Education Law which relates to the practice of professional engineering and land surveying in this State.

"In connection with certain work that you have done and certain advertisements, you use the term 'Civil Engineer and Land Surveyor.' Our records show that you are licensed as a Land Surveyor but that you do not hold a professional engineer's license. It will be necessary for you to discontinue immediately the title 'Civil Engineer' as this is a violation of the article above referred to. In addition we would like to have an explanation as to the reason for this violation.

"Yours very truly,

"(signed) JAMES O. HOYLE."

It is most gratifying to know that engineers can count on such sympathetic cooperation from the press and from the enforcement authorities at Albany in their program to make the Licensing Law effective.

* * *

Scientist and Poet

(Continued from Page 7)

scientific penetration. It is in spite of the former's scientific learnings that they have retained their poetical inclinations. Individual cases do not give the license to generalize. What is essential to a plausible conclusion in our search is not extraordinary individual cases but the very nature of the poet's or scient's approach, and consequently, the general tendency of each approach to affect the mind. however, it may be argued that Galileo, Newton, Gaus and Einstein were prompted to discover their great laws by the power of intuition? Undoubtedly they were. Yet, their genius or intuitive power functioned not along vital lines but along abstract lines; the results needs must be consistent with their arbitrary schemas.

True, there is beauty in reflection on the natural laws as derived from pointer readings, which beauty is augmented when one is capable of abstracting those laws and combining them into a brief formula. Each symbol, each expression conveys a multiform of past and even future experiences. Imagine the elation which attends the realization of possessing power to bend, or harness nature to one's own convenience. Yet, if you compare it with the poetical vision of nature, you feel that scientific beauty is like a neat working drawing, or a silhouette, while the poetic aesthetical experience resembles an oil painting.

As to the essence of human emotions, the scientists fail short indeed. Human emotions are too elusive to abstract metrically. The so-called exact scientists and mathematicians do not venture even to meddle with them. The pseudo-scientists, psychologists and phsiologists, who are trying to study our emotions as they would mechanisms, are severely criticised by their more poetical colleagues, as in the work of J. B. S. Haldane, labeled "Mechanism, Life and Personality." Can you picture to yourself any one of the psychologists reaching the depths of our emotions with such an implicit understanding as a Shakespeare, a Thomas Hardy, a Dostoefsky, Beethoven or Mussourcsky?

There is unquestionably utility and convenience in the scientific schemes which are imperative for the development of society and for the satisfaction of our searching curiosities and analytical faculties. But, that the creators of schemes and formula are to be considered in the same category with great poets, who are fortunate to possess an implicit sensitiveness together with mystical intimate experience is, perhaps, a too hasty generalization, which to-date has not been demonstrated. We still, therefore, must be inclined to agree with Eddington that the poet's realm is consciousness and the scientist's realm is the laws of phenomena conceived metrically.

* * *

What is Technocracy?

(Continued from Page 9)

should they ever materialize.

Aside from the purely technological aspect, there is another vital consideration in our present price system. This is the monetary debt. The total debt of this country—bonds, mortgages, bank loans, and all other interest-bearing amortized securities, totals approximately $218,000,000,000.

The return on investment in industry is constantly being re-invested in industry on the assumption that debts can be increased to infinity since production is restricted only to the limitless desires of individuals for products contributing to their comforts and enjoyments of life. The fallacy of this expansion has been shown by technology. Nevertheless, we have been increasing our debt structure at a fast rate, issuing bonds on this equipment and doing all this with no regard for the future. It has been common to issue bonds on equipment that was either obsolete at the time of installation or that became so soon after. We are still paying for equipment that was removed because of obsolescence years ago. Some of our railroad bonds will not mature for decades and yet 99% of the locomotives on our American railroads are obsolete. We have "issued a debt claim on posterity" on a false theme of expansion to infinity and now the fixed charges on our debt have risen to half the national income! Obviously, from the financial standpoint, the merry circus cannot keep up indefinitely, and there is every in-

dication that the limit is about reached.

As long as we were expanding industrially, our system could tolerate a haphazard control. Our progress absorbed our mistakes and the ultimate reckoning was thrown off into debt. But the turn has come. Technology has caught up with expansion with a vengeance and found us unprepared. The only reason why our day of reckoning has not come earlier is because industry, cognizant of the fact that technocracy was capable of producing better goods, has kept itself moving by selling cheap goods, thus necessitating replacements. We are paying for our price system by buying "new models," the "latest designs" and colors. If industry, with what it knows today, should sell to the American people the best that it could produce, most factories would have to shut down for a period of years.

Technocracy tells us that with what is known now about the application of technocracy, the adult population of this nation would have to work only four hours a day for four days a week to supply us with all our material needs. The replacement business of industry cannot for long exist under our present price system, for new equipment, new inventions, are constantly being placed in use. In short, there is no way out without an entire revision of standards of valuation.

The "share work" program now being promoted in industry needs little comment. It is sterile of all logic or sense. The total amount of work remains the same. One pie is merely cut into eight pieces instead of four. What happens to the income of the individual? If the individual who is fortunate enough to be working for $50 a week "shares" his work so that he gets $40 a week, his standard of living must necessarily drop because of the $10 reduction. Sharing will certainly not increase the purchasing power, and industry cannot move until the purchasing power is raised. Then, too, remember that very few plants are working anywhere near full time, and the fact that many plants are carrying men on the payrolls without being able to use them in the plants.

Let a technician, Mr. Scott, sum up some challenging conclusions of Technocracy:

"The political administrations of the social states of the past and present price systems arose out of the steady state of doing work. The mechanism of these political orders of a price system are, and were, the mechanics of a static system in which the element of change in the rate of energy transversion does not enter. All of our social institutions have arisen out of an historical background which is to the technologist a steady state or a static system. The percentage of error which was inherent in the decision arrivation of the past was tolerable because the administrators who were called upon to execute these decisions were dealing with a price system in which the social rate, or the rate of the whole social mechanism, was unchanged from one period to another.

"The process of decision arrivation used in a modern power transmission system is without precedent or historical ancestors. The method of arriving at social decisions in a dynamic continent-wide mechanism wherein the element of change intrudes itself into every national rate of flow of goods or service, must be such that the intolerance or precision must be obtained in quantitative units peculiar to the rate which is being measured. It follows that this civilization on the North American continent must be operated on a thermo-dynamically balanced load.

"A social change is defined by the technologist as a change from one rate of energy transversion to another, from one order of magnitude to another. Prior to the introduction of technocracy all the changes of history were but the symptomatic changes of a steady state of energy transversion, or expressed in simple language, of the social mechanics depending solely upon the human engine as the only means of converting the available energy into goods and services.

"Technocracy has ushered in the first social change in human history, and each succeeding discontinuous wave of technological advance has succeeded in raising the consumption of energy per capita still higher. The law of the conservation of energy, while well known in the field of physics and engineering has at last become obvious in its social and political implications: that all rates of growth in a social mechanism, whether of goods, population, energy, equipment or structures, when they have reached the total number now extant on this continent, must have these rates of growth predicated upon the law of the conservation of energy.

"The greater the amount of energy consumed per capita the more is necessitated a new order of technocracy and a method of decision arrivation peculiar to the fundamental factors of a dynamic state. Due to the factors hitherto stated, it is increasingly obvious that the methods of arriving at decisions regarding our social mechanism as a whole must arise from a technological sequence similar to that of a modern high tension transmission line.

"That is to say, that all social problems of North America today are technological. They have moved up to where they can be dealt with only in a continental order of magnitude. We can no longer deal with the lack of purchasing power, or unemployment, or debt, by individual establishments or businesses. They can be dealt with only as parts of our industrial complex in a continental order of magnitude. Any political or economic attempt to deal with the problems that are arising on this continent will of necessity be only palliative and temporary expedients to final gestures of restraint to blockade the incoming of a new technological order.

"The directors of our national enterprise are compelled under the exigencies of a price system to have no choice of alternation except that of expedient narcotics."

The next two years will witness a succession of remedial palliatives to be offered by our legislative bodies, our financial institutions and social organizations. America in that period will witness a procession of the dumb, the halt and the blind, stumbling from one futile gesture to another into a final sublimation of fear. That procession of the blind will include all the essence of futility in its many varied forms from the mild buck-passing program of "share the work" to the anticipated probable legislation of rent and private debt moratoriums, to those twins of finality, the dole and complete inflation.

If the present trends continue, it is quite likely that the United States will witness such a progression, a quite natural outcome of a century and a half of the internecine warfare of technocracy and the entrepreneur of the price system. The present problems, in their continental order of magnitude, we have attempted to delineate for those directors of our national enterprise. These directors will now, or in the near future, be called upon to solve these problems. It is their ship of state, and if they cannot find a solution the force majeur of continental conditions in the next few years will bring forth those who can. These problems transcend all social theories and partisan politics—even government. It is civilization itself. Technocracy has written "mene mene tekel upharsin" across the face of the price system.

Attention is directed to numerous articles appearing in The American Engineer in which have been set forth the need for a reorganization of society and a revamping of political economy, with the engineer as the inevitable directing force in the epoch now at hand.

* * *

New York News

(Continued from Page 10)

the Mayor of the City of New York, by the Merchants' Association of New York which expended upwards of $50,000 in the necessary studies, researches and work of compilation. It has been formally submitted for adoption to the Board of Aldermen who will hold public hearings beginning in the early part of January, 1933.

The Chapter is undertaking its studies in connection with the engineering services which will be required under the Code. Its Committee will cooperate with a general committee under the chairmanship of Arthur V. Sheridan and with the Building Code Committees of the other Chapters in New York City to coordinate joint recommendations and select a representative to present such recommendations for the consideration of the Board of Aldermen.

The matters of the location of garbage incinerators in The Bronx and the completion of the Tri-Borough bridge, which is now in progress, were also discussed at the meeting.

RAPHAEL J. SMYTH,
Chairman Committee on
Chapter Activities.

* * *

HAS YOUR LICENSE BEEN RENEWED FOR 1933?

New Jersey News

(Continued from Page 11)

2. The assurance that the State Board will enforce the Code of Ethics.

Matter was tabled since the Code of Ethics is not a part of the law and therefore not enforceable by the State Board.

3. An omission of the distinction between different branches of professional engineering in the license certificates.

After discussion, the matter was ordered tabled.

4. The assurance that no new license will be granted by the State Board without submitting applicant to a written examination covering general engineering principles and sundry subjects in one of the four major branches, i. e. civil, electrical, mechanical and chemical engineering. Except only those who have been duly registered by the National Council of State Boards.

This matter was ordered referred to the State Board.

5. Requesting the State Board to urge governing bodies to forbid men employed on a salary basis for full time work to do private work in competition with private practitioners.

Referred to the State Board of Professional Engineers.

IV. *Amendments to Constitution and By-Laws of Association.*

1. Regulation of dues and their collection.

2. Fixing the term of the Legislative Committee appointed by one president for one year beginning July 1st.

Referred to Committee regarding amendments and same to be submitted at next Annual Meeting.

3. Establishment of permanent headquarters during legislative sessions in Trenton and providing for expenditures by higher dues.

No action taken and matter tabled.

4. Co-operation, and if possible, amalgamation with other engineering societies in the State.

It was voted to co-operate with other engineering societies in the State for mutual benefit.

V. *More Members.*

Referred to the Board of Trustees.

Letter received from Essex County Chapter regarding membership for "Junior Engineers" was ordered referred to the Board of Trustees.

Letter received from Passaic County Chapter regarding the use of the radio for talks by members of the Association on engineering problems affecting the State, Counties and Municipalities, was referred to the President for the appointment of a Committee on Arrangements for Radio Broadcast.

* * *

Examination Questions

(Continued from Page 8)

11 Given the floor framing plan shown below, where the solid lines represent the supporting beams and the shaded area is loaded. The floor load per square foot, including the weight of the floor, is 225 pounds. Select the lightest weight standard I beam, *AB*, that can carry the floor load with a stress of 16,000 pounds per square inch. All beams are supported only on the outside walls.

12 A masonry dam of triangular section with the upstream face vertical and 50 feet high retains water to the level of the top of the dam. What should be the minimum width of the base in order that there be no tension developed at the foundation? [Weight of masonry 145 pounds per cubic foot; weight of water 62.5 pounds per cubic foot]

Part II
MECHANICAL ENGINEERING
(First half)

Thursday, June 30, 1932—9:15 a. m. to 12:15 p. m., only

Answer any five of the following questions. Slide rule and any reference books may be used. Return these questions with your answer papers.

Return at 1:15 p. m. for the second half of this examination.

1 A nine-cylinder, four-cycle, single-acting, aircraft engine runs at 1500 r. p. m. The M. E. P. is 125 pounds per square inch; cylinder dimensions 5″ x 7″; mechanical efficiency 90%. What is the brake horsepower?

2 What are the objects of an evaporative test of a steam boiler? What readings and measurements are essential? What determines the necessary length of run?

3 Draw a neat diagrammatic sketch showing the path of flue gases through a water tube boiler, air-pre-heater, economizer, boiler breeching and stack, arranging the units in proper sequence.

4 A horizontal-return tubular boiler 78 inches in diameter and 20 feet long has 78—4″ tubes. What is its boiler horsepower rating? If this boiler produces 6000 pounds of steam per hour from a feed-water temperature of 50° F. to steam at 115 pounds per square inch absolute pressure, at what per cent of rating is the boiler operating?

5 A steam plant is to be built having a capacity of 500 kw., to be operated 10 hours daily and be shut down 14 hours daily. The load varies from 200 kw. to 500 kw. State briefly the type of prime-movers you would consider purchasing for this plant and the type of boilers you would select. Give reasons for your choice of type.

6 Two parallel shafts are to be connected by spin gearing having 15° involute teeth. The driving shaft is to rotate at 100 r. p. m. and the driven shaft at 500 r. p. m. The minimum number of teeth to be used on the pinion is 13. These gears are to transmit 40 h. p. What size teeth (diametral pitch) should be used? [Materials: pinion, steel, gear, cast iron]

(Continued in January Issue)

* * *

THE ENGINEER

From Bulletin of General Contractors' Association

The November issue of the Wisconsin Engineer contains an amusing, if not strictly accurate, description of the modern engineer, which has been abstracted from the General Contractors Bulletin for October.

"Since the Lord made the earth in six days, engineers, although paid on the six-day basis, have continued to work seven days and nearly as many nights a week. An engineer can be identified by his trusting look, the resigned expression on his face, and a table of sines and cosines carried near his heart.

Through the ages, the engineer has continued to function, until now our technical schools yearly turn upward of 10,000 young hopefuls on the American public, each armed with a slide-rule, two handbooks and a bad case of brain fatigue due to four years or unremitting toil. Some of these souls are immediately saved by becoming bond salesmen and insurance agents. Some of the remaining souls, after working incessantly as engineers, gain success by becoming advertising managers, accountants, salesmen and managing executives. But, alas, some fail and become Assistant Chief Engineers, Chief Engineers, and if complete failures, become Consulting Engineers.

Our government has had two famous engineers who gained fame by ceasing their chosen occupations and becoming Public Servants—George Washington and Herbert Hoover. An engineer with the temperament of a grand opera star is an inventor and can be recognized by long hair and flowing bow tie.

There is only one engineer on record who has become rich. He recently died in Colorado and left a fortune of $50,000 which he amassed through unceasing toil, superhuman perseverance, remarkable ingenuity and the death of an uncle who left him $49,995.00.

Engineering is a good deal like golf. Those who are good drivers becoming managing executives; for those whose best shots are brassie, the advertising profession offers a good opportunity in case of a good lie; those who approach will find salvation in salesmanship, and those good on the green become cashiers and investment brokers. The duffers remain engineers."

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THE LICENSE LAW SINCE 1920

By Roy G. Finch, Secretary—Engineers' Board of Examiners

(Continued from Previous Issue)

Roster, or Annual Printed Lists of Licensed Professional Engineers and Land Surveyors.

A roster of all licensed Prof. Engrs. and Land Surveyors shall be prepared by the secretary of the board during the month of January of each year, and a copy mailed to each licensee and to the clerk of each county in the state. Section 1456.	No change. Section 1456.	Between May 1st and 10th of each year, the department shall publish and mail to every licensee and clerk of each county in the state, a printed list of the legally registered Prof. Engrs. and Land Surveyors. Section 1453.

Unlawful Acts and Penalties.

(1) Practicing without a license except as exempted. Section 1462.	No change. Section 1462.	Worded slightly different, but no change in provision. Section 1455.
(2) Presenting or attempting to file as his own the certificate of license of another. Section 1462.	No change. Section 1462.	Worded slightly different, but no change in provision. Section 1455.
(3) Giving false or forged evidence to the board in obtaining a license. Section 1462.	No change. Section 1462.	Worded slightly different, but no change in provision. Section 1455.
(4) False impersonation of another practitioner of a like or different name. Section 1462.	No change. Section 1462.	Wording slightly different, but no change in provision. Section 1455.
(5) To use or attempt to use an unexpired or expired or revoked certificate of license. Section 1462.	No change. Section 1462.	Use or attempt to use a revoked license. Section 1455.

(Continued in January Issue)

LICENSES GRANTED

November, 1932

Adams, Daniel F.
Albany, N. Y.

Andrews, Eric A.
White Plains, N. Y.

Archila, Fulgencio
New York, N. Y.

Beam, Carl E.
New York, N. Y.

*Benedict, Lee L.
Batavia, N. Y.

*Bleuvelt, John I.
Paterson, N. J.

Bonney, Guy
Beaver Falls, N. Y.

*Borden, Olney
Liberty, N. Y.

Borsuk, Robert
Brooklyn, N. Y.

Brady, Joseph A.
White Plains, N. Y.

Briganti, Domenico
Bronx, N. Y.

Chamberlain, Don E.
Caneadea, N. Y.

Chase, Cladd H.
Brooklyn, N. Y.

Clark, J. Andrew
Poughkeepsie, N. Y.

*Conrad, Frederick X.
Port Jervis, N. Y.

Czarnecki, Frank C.
New York, N. Y.

Daniels, Henry
Poughkeepsie, N. Y.

Davidson, Fred G.
Oakland County, N. Y.

Davies, Clarence E.
New York, N. Y.

Dean, Harlow W.
Albany, N. Y.

*Forness, Leslie P.
Allegany, N. Y.

Forsyth, Joseph R.
Brooklyn, N. Y.

*Foster, Cyrus W.
Beacon, N. Y.

Gates, Robert M.
New York, N. Y.

Glassman, Charles
Tompkins, S. I.

Harmel, Robert L.
Brooklyn, N. Y.

*Hastings, John A.
Warrensburg, N. Y.

Holm, Clemens F.
Brooklyn, N. Y.

*Houlihan, Leo E.
Oriskany Falls, N. Y.

Johnson, W. Ogden
Bronxville, N. Y.

Jory, Robert
Elizabeth, N. J.

Klemin, Alexander
Bronx, N. Y.

Krekel, Hubert
Baltimore, Md.

*Laverty, Francis J.
Pleasantville, N. Y.

McConnell, Franklin P.
New York, N. Y.

McElwain, Harold B.
Rochester, N. Y.

*Manley, Robert W.
Phoenix, N. Y.

*Martin, Edward J., Jr.
Tarrytown, N. Y.

Mason, John R.
Tonawanda, N. Y.

Obermann, Robert F.
Garfield, N. J.

O'Brien, Thomas S.
Albany, N. Y.

Perry, Norvin
New York, N. Y.

Piddian, Joseph
New York, N. Y.

Pierce, Robert G.
Tuckahoe, N. Y.

*Pratt, Roy E.
Franklinville, N. Y.

Prochazka, Geo. A., Jr.
New York, N. Y.

Quinterro, John C.
Syracuse, N. Y.

*Rose, Howard D.
Kingston, N. Y.

Roser, Frederick A.
Utica, N. Y.

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November 14, 1932.

SECOND APPEAL

Dear Mr. Engineer:

This week Metropolitan New York will actively turn its attention to the needs of its people. The Engineering Societies commenced their work a month ago. Our first appeal was mailed to our membership on October 27th.

The returns to date have not been encouraging but we believe our people are waiting to determine the overall need before they make their pledge for their *own* group.

We now must make our commitments and your Committee hopes and believes that you will not overlook the needs of your brother engineers.

Among those registered may be classmates, fraternity brothers, or even friends or acquaintances of yours. Often one feels more inclined to offer assistances to those he knows personally. If you would like a first-hand story of the situation as a whole covering the distress prevalent among many of our unfortunate brothers, I will welcome the opportunity personally of discussing the matter with you.

The reported improvement in employment has not as yet provided relief to unemployed engineers, and we must realize that the severity and duration of this depression has brought distress to many deserving engineers. Last winter men in our engineering profession were in urgent need of help and that help was given by you through your P. E. C. U. Committee.

We need more money and we need it now. Help your fellow engineers —support the efforts of your Committee.

A card and return envelope are enclosed for your convenience in making your subscription. Please reply.

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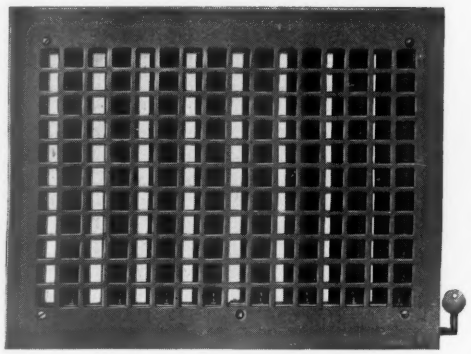

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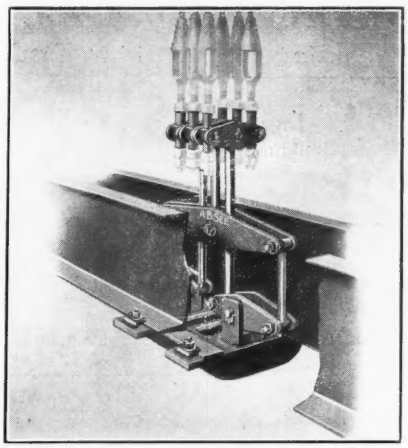

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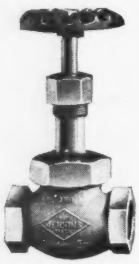

Fig. 106-A

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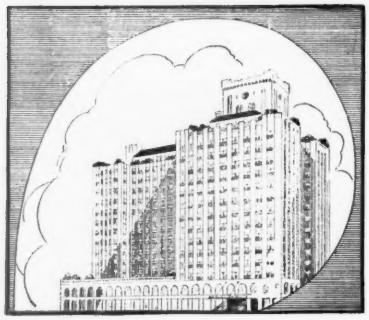

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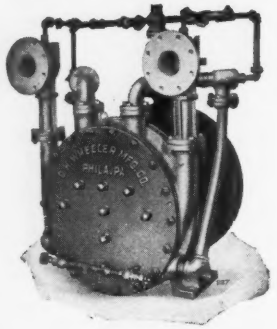

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